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### Abstract

**Title:** *High-Q Microcavities for Biosensing and Light Manipulation*

Optical microresonators with small modal volumes and high quality (Q) factors significantly enhance interaction of the optical field with the material through recirculation, which makes them exceptionally sensitive to the optical properties of the resonator and the surrounding medium. We use this attribute for biosensing, where binding of only a few molecules on the microcavity surface shifts the frequencies of the resonant modes that evanescently interact with the adsorbed material. Furthermore, a pump-probe spectroscopy is implemented where a visible optical pump centered at a molecular absorption band induces changes of molecular structure which are dynamically monitored with an infrared probe. We demonstrate this approach by measuring conformational changes in the biological photochrome *bacteriorhodopsin* (bR). Furthermore, we use the photoinduced molecular transitions in a self assembled bR monolayer to reversibly configure a micron-scale add-drop filter.

### Biography

**DR. VOLLMER** is currently a Junior Fellow at The Rowland Institute at Harvard. He received his M.S. in Biochemistry in 1998, and his Ph.D. in 'Physics in Biology' from The Rockefeller University, New York, in 2004. For his master thesis he worked in Dr. Robert Roeder's Laboratory of Biochemistry on the characterization of an eukaryotic transcription factor. His Ph.D. thesis was supervised by Dr. Albert Libchaber: the work in experimental physics concerned perturbations of high-Q optical microcavities with nanoparticles and biomolecules for detection and analysis. He received a scholarship from the Boehringer Ingelheim Fonds, Germany.